A Unified Trading Model Based on Robust Optimization for Day-Ahead and Real-Time Markets with Wind Power Integration - DTU Orbit (19/03/2018)

**A Unified Trading Model Based on Robust Optimization for Day-Ahead and Real-Time Markets with Wind Power Integration**

In a conventional electricity market, trading is conducted based on power forecasts in the day-ahead market, while the power imbalance is regulated in the real-time market, which is a separate trading scheme. With large-scale wind power connected into the power grid, power forecast errors increase in the day-ahead market which lowers the economic efficiency of the separate trading scheme. This paper proposes a robust unified trading model that includes the forecasts of real-time prices and imbalance power into the day-ahead trading scheme. The model is developed based on robust optimization in view of the undefined probability distribution of clearing prices of the real-time market. For the model to be used efficiently, an improved quantum-behaved particle swarm algorithm (IQPSO) is presented in the paper based on an in-depth analysis of the limitations of the static character of quantum-behaved particle swarm algorithm (QPSO). Finally, the impacts of associated parameters on the separate trading and unified trading model are analyzed to verify the superiority of the proposed model and algorithm.

**General information**

State: Published
Organisations: Department of Electrical Engineering, Center for Electric Power and Energy, Energy system operation and management, Fuzhou University
Authors: Jiang, Y. (Ekstern), Chen, M. (Ekstern), You, S. (Intern)
Number of pages: 19
Publication date: 2017
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Energies
Volume: 10
Issue number: 4
Article number: 554
ISSN (Print): 1996-1073
Ratings:

- BFI (2018): BFI-level 2
- Web of Science (2018): Indexed yes
- BFI (2017): BFI-level 2
- Web of Science (2017): Indexed yes
- BFI (2016): BFI-level 2
- Scopus rating (2016): CiteScore 2.5 SJR 0.691 SNIP 1.053
- Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 2
- Scopus rating (2015): SJR 0.804 SNIP 1.416 CiteScore 2.87
- Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 2
- Scopus rating (2014): SJR 0.87 SNIP 1.601 CiteScore 2.66
- Web of Science (2014): Indexed yes
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 0.632 SNIP 1.345 CiteScore 2.29
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 0.874 SNIP 1.54 CiteScore 2.46
- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 0.659 SNIP 1.439 CiteScore 2.24
- ISI indexed (2011): ISI indexed no
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 0.303 SNIP 0.76

Original language: English